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ABSTRACT

Presented is a guide to fifteen, 20-minute television lessons on the metric system. The guide and television series are designed to reach grade levels five through eight and the "general uninformed adult population." The guide and series are designed to help motivate people to want to know more about the metric system of measurement. The meter, liter, and gram and presented as basic units. The use of decimal notation is promoted and the need for learning about any specific measuring system through direct experience is emphasized. Activities suggested in the guide relate every episode to everyday, lifelike situations. (MP)

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THE METRIC SYSTEM

Teacher Guide

THE METRIC SYSTEM

Fifteen, 20-minute lessons
for
Grades 5 through 8 and
the general uninformed adult population

Produced by

Mississippi Authority for Educational Television
Jackson, Mississippi

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GUIDELINES FOR GRADE-LEVEL USE

"THE METRIC SYSTEM series is designed to reach grade levels five through eight and the general uninformed adult population. It is recommended that the first 10 programs be used intensely at the fifth- and sixth-grade level if one wishes to present the metric system with a minimum of comparison to the English system. However, should one choose to use all 15 programs at the sixth-grade level, we feel that there will be benefits gained. If used at the seventh- or eighth-grade level, it is recommended that the entire 15 programs be used since we feel that the last five programs will help a student already familiar with the English system to make necessary comparisons between the two systems. If any programs are used below the fifth grade, we recommend that only the first five programs be used and only for advanced third and fourth grades. We do not feel that the programs will benefit first and second graders at all."

--Niles F. Calhoun
Mathematics Coordinator
Mississippi Educational Television

General Information About The Content And Utilization
Of THE METRIC SYSTEM Series

This series is designed to help motivate viewers to want to know more about the metric system of measurement. It also is designed to familiarize the viewer with metric terms and to relate in a common-use way the more familiar metric units of measure.

If you are expecting a teachy, much-stuff-to-memorize, cognitive-only series, you will be disappointed. However, each little segment which makes the series content come alive is designed to fulfill at least one special purpose. It should be noted that teachers who use the series should not attempt to follow-up every segment of every program, but they should pick out one or two segments from each program to discuss, recreate or expand upon after the viewing.

Throughout the series, we attempt to present meter, liter and gram as basic units. In our definition, we mean basic units to be "naming" units--the units to which we add prefixes. The base units as defined in the System Internationale are referred to in the lessons as standard units. (In most lessons, only basic units will be used.)

Also, we emphasize the units which use prefixes milli, centi and kilo more than the other units, although we feel it is necessary to know all the prefixes from milli through kilo in order to relate the metric system to other decimal systems.

We try to relate every episode to everyday, lifelike situations. We sometimes relate English to metric units, but even in the last five lessons we will establish only simple basic ratios for general purposes. It is best, we feel, to teach metric as much apart from the customary as is possible--but we also feel simple comparisons will be necessary for some people.

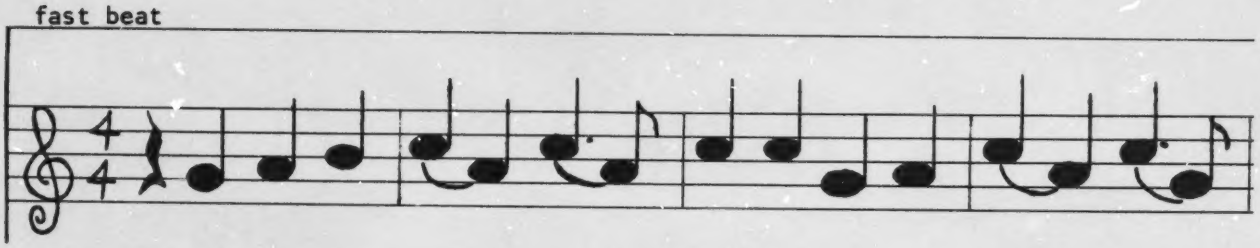
We feel that the use of the decimal notation should be emphasized in measurement activities.

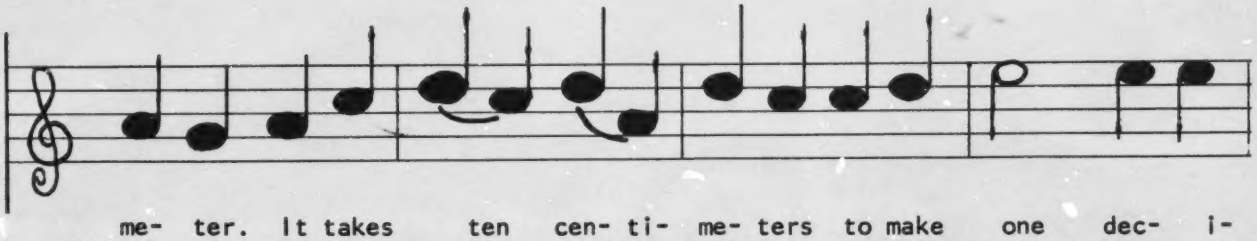
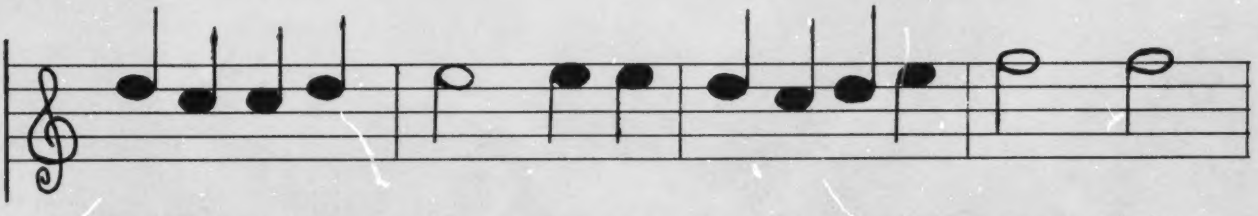
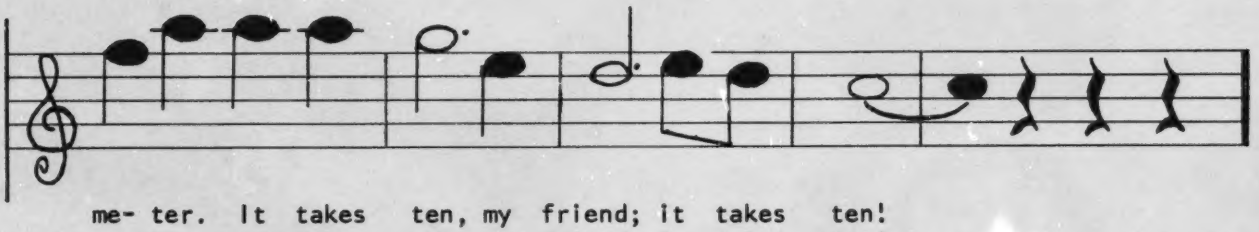
Finally, we might point out that we think measurement and the use of any specific measurement system is learned only through experience--so actual measuring experience with metric units following the programs is most necessary. For the most part, we depend upon the teacher to know his/her students and plan the measuring exercises accordingly.

--Niles F. Calhoun,
Mathematics Coordinator

It Takes Ten

fast beat



Now it takes ten mil- li- me- ters to make one cent- i-
And it takes ten whole me- ters to make one de- ka-

me- ter. It takes ten cen- ti- me- ters to make one dec- i-
me- ter. It takes ten dek- a- me- ters to make one hec- to-

me- ter. It takes ten de- ci- me- ters to make one whole
me- ter. It takes ten hec- to- me- ters to make one kilo-

me- ter. It takes ten, my friend; it takes ten!
me- ter. It takes ten, my friend; it takes ten!

THE METRIC SYSTEM--EVALUATION (Pretest before Lesson 1; posttest after Lesson 10.)

DIRECTIONS: ON YOUR ANSWER SHEET, MARK IN THE SPACE THAT MATCHES THE LETTER OF THE CORRECT ANSWER. DO NOT WRITE ON THIS SHEET, PLEASE.

1. The metric system is based on multiples of (a) 10 (b) 100 (c) 1,000 (d) 10,000 (e) I don't know

2. The sumbol for the modernized version of the metric system is (a) IS (b) ISU (c) SI (d) USA (e) I don't know

3. The basic naming unit of volume in the metric system is the (a) meter (b) liter (c) gram (d) cubic centimeter (e) I don't know

4. Which of the following is the largest unit? (a) dekagram (b) decigram (c) milligram (d) kilogram (e) I don't know

5. The distance from a certain town to another town is 8 kilometers. This is equal to (a) 80 meters (b) 8 meters (c) 8,000 meters (d) 800 meters (e) I don't know

6. A liter is slightly more than a (a) cup (b) pint (c) quart (d) gallon (e) I don't know

7. The smallest unit on a meter stick is usually a (a) millimeter (b) centimeter (c) decimeter (d) meter (e) I don't know

8. A cubic centimeter is a unit of (a) area (b) length (c) volume (d) weight (e) I don't know

9. The basic unit of length in the metric system is the (a) cubic centimeter (b) liter (c) gram (d) meter (e) I don't know

10. The basic naming unit of weight (or mass) in the metric system is the (a) cubic centimeter (b) gram (c) liter (d) meter (e) I don't know

11. Five thousand grams is equal to (a) 5 kg (b) 50 kg (c) 500 kg (d) 5,000 kg (e) I don't know

12. On the Celsius temperature scale, 100 degrees indicates the (a) freezing point of water (b) a nice warm day (c) the boiling point of water (d) your body temperature (e) I don't know

13. In 2.5 liters, there are (a) 250 ml (b) 25 km (c) 2,500 ml (d) 0.125 liters (e) I don't know

14. A meter equals (a) 1,000 cm (b) 0.001 km (c) 200 centimeters (d) 10 km (e) I don't know

15. A unit of volume that is the same as one cubic decimeter is the (a) meter (b) liter (c) gram (d) hectometer (e) I don't know

(Continued)

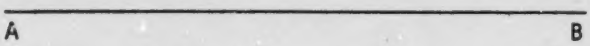
16. We would buy gasoline by (a) the meter (b) the gram (c) the liter (d) the kilogram (e) I don't know

17. The most commonly used unit as well as the standard unit of weight (mass) in the metric system is the (a) kilogram (b) kilometer (c) gram (d) liter (e) I don't know

18. The length of a pencil would probably best be measured in (a) millimeters (b) dekagrams (c) dekameters (d) centimeters (e) I don't know

19. You might see the word meter spelled as (a) metere (b) metre (c) meeter (d) meetre (e) I don't know

20. A good estimate of the length of the line segment below would be (a) 10 m (b) 5 cm (c) 10 cm (d) 1 cm (e) I don't know



Answer Sheet

NAME_____

DATE_____TEACHER_____

	a	b	c	d	e		a	b	c	d	e
1.	( )	( )	( )	( )	( )	11.	( )	( )	( )	( )	( )
2.	( )	( )	( )	( )	( )	12.	( )	( )	( )	( )	( )
3.	( )	( )	( )	( )	( )	13.	( )	( )	( )	( )	( )
4.	( )	( )	( )	( )	( )	14.	( )	( )	( )	( )	( )
5.	( )	( )	( )	( )	( )	15.	( )	( )	( )	( )	( )
6.	( )	( )	( )	( )	( )	16.	( )	( )	( )	( )	( )
7.	( )	( )	( )	( )	( )	17.	( )	( )	( )	( )	( )
8.	( )	( )	( )	( )	( )	18.	( )	( )	( )	( )	( )
9.	( )	( )	( )	( )	( )	19.	( )	( )	( )	( )	( )
10.	( )	( )	( )	( )	( )	20.	( )	( )	( )	( )	( )

Test Key

NAME: _____

DATE: _____ TEACHER _____

ANSWER SHEET

	a	b	c	d	e	
1.	( )	( )	( )	( )	( )	a
2.	( )	( )	( )	( )	( )	c
3.	( )	( )	( )	( )	( )	b
4.	( )	( )	( )	( )	( )	d
5.	( )	( )	( )	( )	( )	c
6.	( )	( )	( )	( )	( )	c
7.	( )	( )	( )	( )	( )	a
8.	( )	( )	( )	( )	( )	c
9.	( )	( )	( )	( )	( )	d
10.	( )	( )	( )	( )	( )	b
11.	( )	( )	( )	( )	( )	a
12.	( )	( )	( )	( )	( )	c
13.	( )	( )	( )	( )	( )	c
14.	( )	( )	( )	( )	( )	b
15.	( )	( )	( )	( )	( )	b
16.	( )	( )	( )	( )	( )	c
17.	( )	( )	( )	( )	( )	a
18.	( )	( )	( )	( )	( )	d
19.	( )	( )	( )	( )	( )	b
20.	( )	( )	( )	( )	( )	c

kilo	k	
hecto	h	
deka	da	
*basic unit		meter m liter l gram g
deci	d	
centi	c	
milli	m	

note: 0.25 m

25 cm

10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}
thousands	hundreds	tens	ones	tenths	hun-dredths	thou-sandths

thousand dollars	hundred dollars	ten dollars	dollars	dimes	cents	mills

kilo	hecto	deka	basic unit	deci	centi	milli

13

All You Will Need to Know About Metric
(For Your Everyday Life)

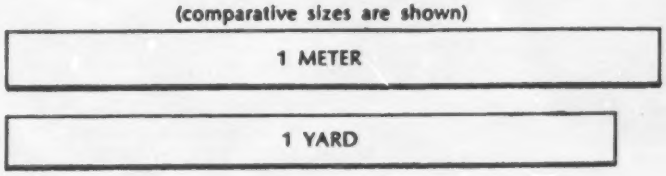
10 Metric is based on Decimal system

The metric system is simple to learn. For use in your everyday life you will need to know only 10 units. You also will need to get used to a few new temperatures. Of course, there are other units which most persons will not need to learn. There are even some metric units with which you are already familiar: those for time and electricity are the same as you use now.

BASIC UNITS

METER: a little longer than a yard (about 1.1 yards)
LITER: a little larger than a quart (about 1.06 quarts)
GRAM: about the weight of a paper clip

(comparative sizes are shown)



25 DEGREES FAHRENHEIT

25 DEGREES CELSIUS

COMMON PREFIXES
(to be used with basic units)

Milli: one-thousandth (0.001)
Centi: one-hundredth (0.01)
Kilo: one-thousand times (1000)

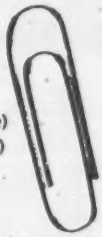
For example:
1000 millimeters = 1 meter
100 centimeters = 1 meter
1000 meters = 1 kilometer

1 LITER

1 QUART

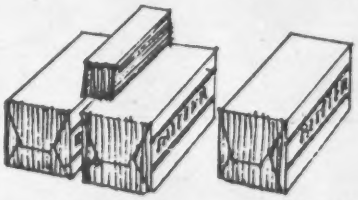
OTHER COMMONLY USED UNITS

Millimeter:	0.001 meter	diameter of paper clip wire
Centimeter:	0.01 meter	width of a paper clip (about 0.4 inch)
Kilometer:	1000 meters	somewhat further than ½ mile (about 0.6 mile)
Kilogram:	1000 grams	a little more than 2 pounds (about 2.2 pounds)
Milliliter:	0.001 liter	five of them make a teaspoon



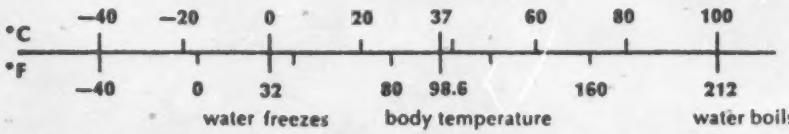
OTHER USEFUL UNITS

Hectare: about 2½ acres
Tonne: about one ton

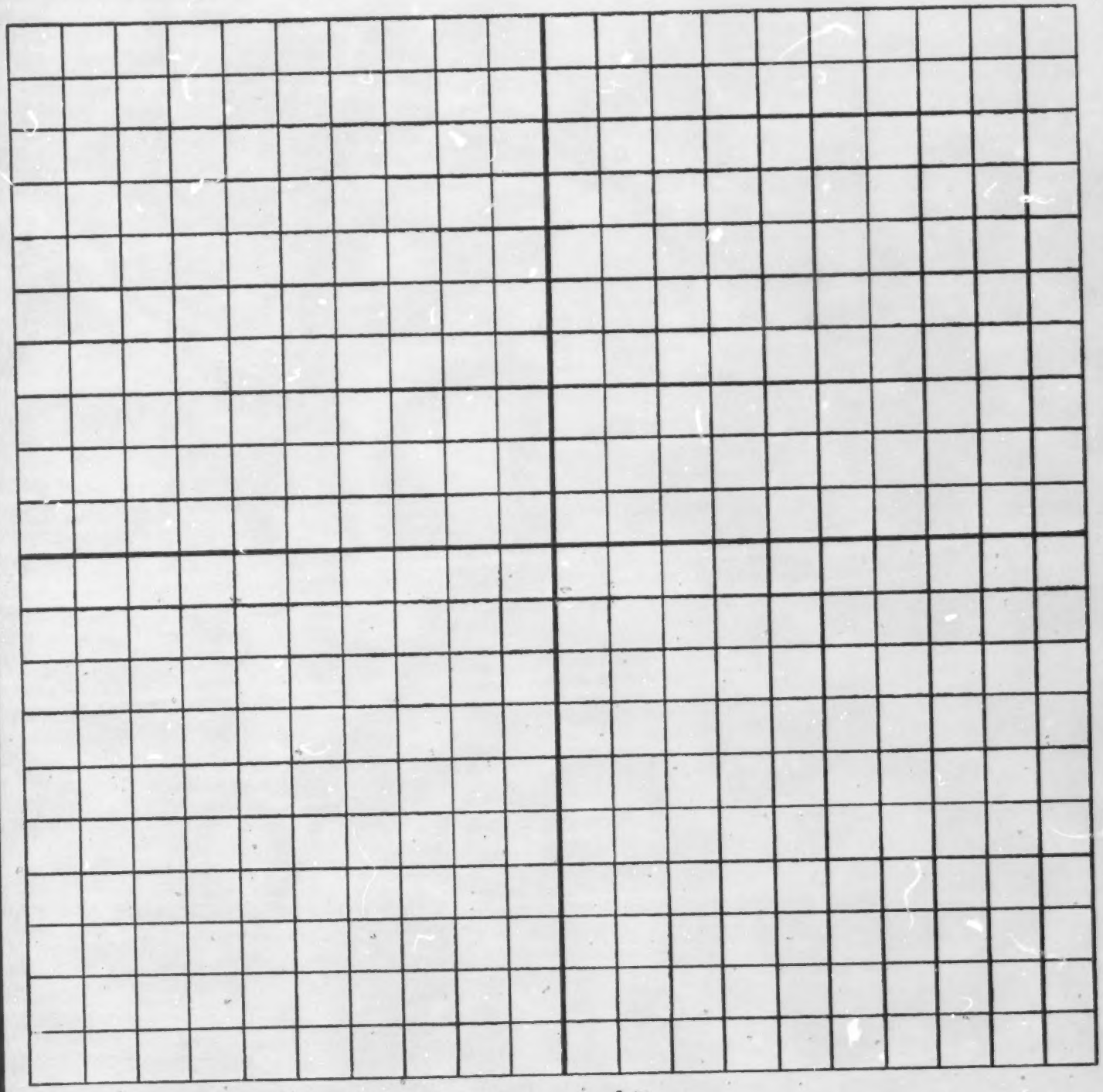


1 KILOGRAM 1 POUND

TEMPERATURE
degrees Celsius are used



For more information, write to: Metric Information Office, National Bureau of Standards
Washington, D.C. 20234



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Lesson 1--INTRODUCING THE METRIC SYSTEM

In this opening lesson of the new metric system series, the meaning of measurement is presented and the metric units--meter, liter and gram--are introduced.

Metric Newscaster Howard Newday introduces System Internationale and points out that it is used all over the world. SI, as it commonly is called, is the modern version of the metric system.

In other segments, Howard Newday presents the basic idea of measurement, defining it as a comparison process. He also points out the need for standard systems of measurement.

In the special program, "A Moment of Music," we hear the Metric Country Waltz, in which meter, liter and kilogram are presented musically.

A special commercial introduces meter, liter and gram and the prefixes milli, centi, deci, deka, hecto and kilo.

The "Harvey and The Professor" segment introduces and illustrates the basic metric units.

The "Metric Minit Movie," featuring honky-tonk piano music in an old-time silent movie setting, illustrates the use of metric units of measurement.

In a special news segment, Howard Newday introduces the decimal system and points out that a decimal system is a system that employs grouping by tens.

In the "Metric Man" segment, Metric Man and his archenemy, the Inchworm, meet in a head-on clash over use of customary versus metric units.

In the closing news segment, Rhoda Reuter has a special feature. Asking people on the street what the metric system is, she receives a variety of answers which seem to reflect that more information about the metric system is needed. (Hopefully, that is what this series will accomplish!)

Follow-up Activities:

1. Each student should use his pencil to measure the length of some object that can be measured by each person in the room--a desk for instance. If they measure desk tops, make sure all the desk tops in the room are the same. It should be pointed out that although the pencils vary in length, the length of the object measured would be constant but expressed in varying units. The measurements will vary because of the nonstandard units used. Point out the need for standard measurement and that the basic idea of measurement is a comparison process. We can compare anything to anything that is similar to it. But what happens when each person has his own nonstandard unit? Point out the need now for a (one) standard system of measurement and define standards as those things that are unchanging and understood by everybody everywhere.

2. In this activity, the dollar and its decimal system should be related to meter and its use of the decimal system. You should present the fact that it takes 10

(Continued)

pennies to make a dime; it takes 10 dimes to make a dollar; it takes 10 dollars to make a 10-dollar bill. Point out the fact that we are grouping each time by 10. Then relate this fact to the meter and its submultiples and multiples, by using a meter stick. It takes 10 centimeters to make one decimeter. It takes 10 decimeters to make one meter. It takes 10 meters to make one of the next units of length, etc. Ask students if they think that they could continue to employ this pattern to develop other units of the meter.

3. Give examples of some items that all the students will be familiar with, and ask what unit of measure would be used to measure these things if we used the metric system. For example, show a picture of a quart of milk and ask what metric unit would be used to measure this. (It should be the liter.) Follow the same sort of pattern and use the kilogram and the meter or the centimeter.

4. Have students measure each other's height in centimeters. Have each student record his name and height on a small piece of paper to be attached by thumbtack to the bulletin board. After Lesson 4, have each student record his weight in kilograms and display it in the same way.

Lesson 2--WHAT IS THE METRIC SYSTEM?

Meters, liters and grams: How we use them and why we need them is presented in today's program. Emphasis also is given to precision in measurement and to decimal systems.

An early commercial points out the need for standardized systems of measurement.

Howard Newday presents the fact that a need to communicate has prompted the adoption of the metric system throughout most of the world.

The Metric Tango is sung and danced on "A Moment of Music".

During today's "Harvey and The Professor" segment, Harvey discovers that knowing the correct unit of measure to use for a specific measurement is very important.

A special "Metric Survey" asks viewers to determine an appropriate unit of measure for measuring the length of a pencil.

A new Miss Ametrica is crowned as the Metric Broadcasting System presents the "Miss Ametrica Pageant".

A special commercial emphasizing the decimal notation used in the metric system is presented.

"Metric Man" today presents Metric Man, ever trying to promote understanding of the metric system, getting involved in explaining decimal systems to Miss Amanda, who would rather be involved in romance!

Note: You will notice that one contestant at the "Miss Ametrica Pageant" answers her question well, but incorrectly according to our definition. She says the kilogram would be a nice unit to use in response to the question, "What is the basic unit of weight?" We have defined basic units to be meter, liter and gram. Kilogram is the standard and most commonly used unit, however. It may or may not be advisable to emphasize this difference.

Follow-up Activities:

1. Review the prefixes used with the three basic units--meter, liter and gram--and point out that each one is a decimal form of a basic unit. Then ask the students if they can tell what each unit that you name means. In other words, pick a unit like milligram and ask the students to tell you what that means. They should say it means a thousandth of a gram. Ask them to give an example of something that might weigh a milligram, etc.

2. Show some real objects and ask what metric unit of measure would be used to measure each. This article should be similar to that shown on "Metric Survey" presented in the program. Show a pencil. The students should say centimeters would be used to measure its length. Show a small object like a nickel and ask how you would measure its weight. They should answer with the name of a small unit like the gram.

(Continued)

3. Again, present the decimal notation used in the metric system by expressing the actual measurement of the objects used in Activity 2 on the board or overhead projector. You might have the students mimic your measuring or do some measurement with a centimeter ruler and record the measurements, in order to relate the abstract symbols to the real thing measured.

Lesson 3--METRIC UNITS OF LENGTH

In today's program, all the common units of length in the metric system are emphasized. The dekameter and hectometer are introduced briefly, while the millimeter, centimeter, meter and kilometer are used in several activities.

The decimal nature of the metric system is reinforced by repeated reference to the statement, "It's based on 10."

In "Metric Arts and Crafts," the viewer can see how to make his own meter stick. This is an actual activity that could be used for follow-up in a classroom. (Its emphasis should be on the fact that this type of homemade meter stick probably won't be a standard meter. Comparing the homemade meter stick to a standard one should lead to an interesting conclusion.)

"You Are The Contestant" serves as an audience-involvement segment wherein the viewers are asked simple questions, given a chance to choose an answer and given immediate reinforcement.

In "Metric Survey," viewers are asked to estimate the length of a regular-size sheet of notebook paper. (Note: Regular-size sheets of notebook paper vary! An examination of this fact could lead to an interesting follow-up activity.)

"Base 10-4" presents two policewomen involved in tracking down a thief. They point out that 2 decimeters and 20 centimeters are the same! Follow-up activities might involve viewers in determining why this relationship exists.

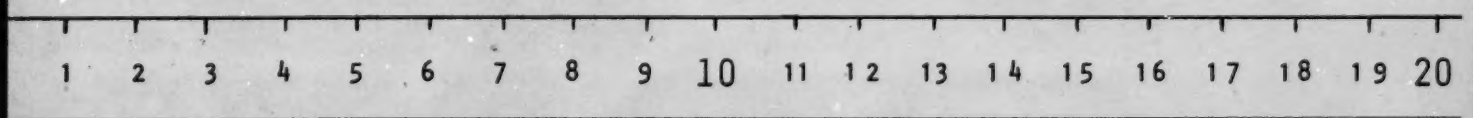
In the "Harvey and The Professor" segment, Harvey discovers that precise measurement is a necessity in his current endeavor. A measurement becomes more precise as the unit used in the measurement gets smaller.

"Paging Mr. Smith" is a science-fiction type of special program. The Mr. Smith who is paged by a messenger trying to deliver a growing plant turns out to be a plant himself--a tree!

In a moment of desperation, Prof. Pennyloafer's students call on "Metric Man" to help them determine the relationships of the millimeter, centimeter and decimeter to the meter.

Follow-up Activities:

1. Have the students reproduce the "make-your-own" meter stick segment from "Metric Arts and Crafts". Use the paper tape from adding machines as your ruler. Then compare this homemade meter stick to a standard meter stick. This comparison should emphasize the need for standard units. Example:



(Continued)

2. With your standard meter stick, meter tape or centimeter ruler, measure the length of a regular-size sheet of notebook paper. See if each of these is approximately 28 centimeters long. Point out to the students the fact that in dealing with measurements, sometimes approximations are all that are necessary. Also point out that when we need to be more precise we always can use a smaller unit of measure. Have students estimate (guess) certain lengths; then have them actually measure the lengths. Approximate (round-off) your measurements to a convenient unit. That is, if a measurement is 27cm and 3mm, just write "27cm". (Note: In most cases we would never need to write 27cm and 3mm, since we could express it as 27.3cm or 273mm. Beginners unfamiliar with decimal notation might need to think "27cm and 3mm" at first, however.)

3. Ask the students to use their rulers to measure different objects. Then ask them to watch as you lead in an activity that shows why 2 decimeters and 20 centimeters are the same. Or why 200 millimeters, 20 centimeters, and 2 decimeters are the same. Ask if they can relate this idea again to the decimal notation that we use in writing measurements. Would one divide or multiply by powers of 10 to express a measurement in a larger unit? (Divide, since it takes groups of small units to make large units. To change from larger to smaller, one would multiply). Perhaps this last question should be asked only of those jr. high and above students--it may confuse younger students at this point.

4. Give the students several conversion-type problems using only metric units. In other words, ask how many centimeters in 4 meters? How many millimeters in 3.5 meters? How many kilometers in 4,500 meters? This sort of thing should be used to check to see how well the relationships within the metric system are getting across. Let students use meter sticks, if they want to, in finding answers.

5. Present the fact that linear, area and volume measurement can be performed using metric units. Demonstrate! This leads into ideas of Lessons 4 and 5.

Lesson 4--METRIC UNITS OF WEIGHT

The purpose of this program is to present gram as a basic or "naming" unit of weight in the metric system, while establishing the kilogram as the standard and most commonly used unit. It also presents some basic facts involved in using the Celsius temperature scale.

An opening commercial points out that it is often more practical to use the kilogram as a common unit of weight. Howard Newday presents the same fact. Howard also reinforces the fact that 1,000 grams are the same as one kilogram.

An intuitive presentation of the reason for kg being the symbol for kilogram is conveyed visually to the viewers.

On "Metric Arts and Crafts," the viewer is told that paper clips weigh about a gram each. Then, with paper clips as an art material, the program shows how to make a metric plaque.

During the "Metric Survey," it is pointed out that 1 kg is about the same as 2.2 pounds. After some examples, the viewer is asked to estimate his weight in kilograms.

"You Are The Contestant" asks the viewer to match some easily recognized things to their weights in kilograms.

Howard Newday introduces the Celsius temperature scale and compares it to the common Fahrenheit scale.

A Celsius commercial followed by a reinforcement show, "Measurement Possible," helps to convey some static temperatures to the Celsius scale.

Harvey has a problem and a lot of nickels, which each weigh 5 grams. The professor tries to help solve Harvey's problem on today's "Harvey and the Professor".

Miss Amanda is upset because she has some boxes of food that are the same size but have different weights. Metric Man's mother happens to drop by and teaches Amanda a simple lesson about density. "Metric Man" finally arrives on the scene, but he proves to be pretty dense when it comes to figuring out what Miss Amanda and Mama are cooking up.

In a final news segment, Rhoda Reuter interviews people on the street concerning which unit of weight they use most often.

Note: In later programs we illustrate the difference between weight and mass and point out that a kilogram is actually a unit of mass. In practical use, however, most people only need be concerned with what we call "weight."

Follow-up Activities:

1. In this lesson follow-up, emphasize that meter, liter and gram are "naming units" and that we use these to indicate what type of measuring we are doing. We can use

(Continued)

these units with all the metric prefixes. Generally, however, we can depend on using only one or two prefixes most commonly. For units of weight we probably will use the gram and kilogram more than any other unit. Again, point out that the kilogram is 1,000 grams. Then ask the students for things which have masses or weights that they would weigh in kilograms.

2. See if each student has a nickel. Ask him to bring it out and hold it in his hands, and ask him to try to feel the weight of that nickel because a nickel should have a mass of 5 grams. Also, relate the fact that one M & M weighs approximately a gram and that certain size paper clips weigh about a gram each. You could point out to him that if he had a carton (which we call the quart size) filled with water, the carton would weigh approximately one kilogram. Also as an activity, ask each student to try to recreate the activity shown in the program, estimating his weight in kilograms if he knows it in pounds.

3. As an example of what we mean by equal weights--having equivalent masses--you could make a balance scale using a coat hanger that would hang on a nail. Have some trays attached to each end of the coat hanger. Find some things such as nickels or paper clips that you could balance to find the weight of other objects since you know nickels weigh about 5 grams and paper clips weigh about one gram.

4. See if you can find some boxes that are the same size. Then fill each box with various substances so that each has a different mass. Try to make the point that the difference in the weight of the containers is not caused by the volume of the substance but by the density of the substance--how compact it is! This may be a little advanced for some students, so try to do essentially as was done on the "Metric Man" segment by showing a couple of boxes that are the same size but have different weights because they have different densities. Let the students feel this difference.

5. Have the students look in the grocery store, or any other store, for objects that might be labeled using metric units. These objects might be double-labeled, using both English and metric units. Have them really try to determine which objects are most properly measured in grams or kilograms, and which are most properly measured in liters. Could a substance be measured in both units? (Generally, yes!) Why would one unit be preferred over the other?

6. Have students draw a Celsius temperature scale. On this scale, have them identify:

1. the freezing point of water (0° Celsius).
2. the boiling point of water (100°C).
3. their body temperature (37°C).
4. a very hot day (approximately 40°C).
5. a nice, warm, pleasant day (about 25°C).

Lesson 5--METRIC UNITS OF VOLUME

In this program, the liter is presented as the basic unit of volume--liquid volume, particularly.

Howard Newday points out that a liter is just a bit more than a quart. Then in a special interview Rhoda Reuter talks to a cow, Mother Moo, to determine the cow's opinion of packaging milk by the liter!

Hetta Chazer, a messy but merry gourmet, whips up a chocolate milk shake to illustrate use of metric units in cooking.

The professor points out to Harvey that a liquid having a cubic decimeter of volume would have a volume commonly referred as 1 liter.

Howard Newday presents a brief review of linear, square and cubic measure in the metric system and points out that we can measure the volume of any substance using either the cubic meter or some derived unit of the cubic meter like the liter.

During "A Moment of Music," we are treated to a jazz rendition of "It's All Based on The Meter," sung by a classy nightclub singer.

A special animation points out the unique relationship between the liter and the cubic decimeter.

"Metric Man" helps solve a problem caused by his old rival, the inchworm, as the Senate prepares to vote on the question of basic unit of volume!

Howard Newday's final news segment illustrates that liquid units of measurement using the liter and its decimal multiples and submultiples easily can be used in everyday life.

Follow-up Activities:

1. See if you can get a quart milk carton or a quart-size Coke bottle and relate to the students the actual difference between a quart and a liter. You do not need to identify the object as a quart container at all, since both of these containers can be made to hold a liter also. You should show, however, that the liter would be more than the quart and a visual presentation of this could be accomplished in many ways. If you like to use the word "capacity," you could define it at this point to mean holding ability of a container.

2. Using a sheet of newsprint, cut 30 cm squares from which can be folded a cubic decimeter, open-topped container. First, fold (by making a 3 x 3 array) the 30 cm square into 9 square decimeters. Crease diagonals for the 30 cm square. Using the center square decimeter as a base turn up corner squares of the larger square to make the container. (Folding a cubic decimeter out of paper determines the real size and shape of a cubic decimeter. Point out that if water had a volume that was the same volume as this cubic decimeter, we could refer to that volume as one liter. You might also reinforce the fact that one liter of water would weigh one kilogram.)

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3. With pencil, paper and ruler, have the students draw certain size standard figures like squares, rectangles, parallelograms, etc., using metric units, generally centimeters. Then see if they can find the area of each of these figures. (It will be very easy to do if you use centimeter graph paper.) Lead them in finding the volume of a figure with the same base as one of the figures they previously found the area of.

4. With older students (junior high and above), try to relate square meter to square decimeter and square centimeter. Then try to relate a cubic meter to a cubic decimeter and to a cubic centimeter.

5. Use various size containers that would hold a liter to show just "how much" a liter is. Different size cartons, jars and other nonmetric containers should be found that would hold a liter. On each, find and mark the level that indicates 1 liter.

6. If you have had students display their heights and weights on individual sheets of paper as was suggested previously, you might now try playing a guessing game using this information. Take down the information sheets, scramble them up, pick some sheets at random, have the students guess the person whose measurement it is, and then have the person whose measurement it is stand to give visual reinforcement.

Lesson 6--PREFIXES

On today's program, the most common metric prefixes--milli, centi, deci, deka, hecto, kilo--are featured along with the basic units meter, liter and gram.

In the opening news segment, Howard Newday points out that the metric system is easy to use because it has a convenient unit of measure for anything, no matter how large or small! We can make convenient units by using prefixes. He also emphasizes the importance of the decimal system and shows us that the metric system multiples and submultiples are exactly the same as the powers of 10 in our numeration system.

Rhoda Reuter covers a space flight in which the importance of our numeration system and the metric system is shown.

Next, Hetta Chazer cooks up a silly little something--a little bit of chicken soup. And she illustrates the meaning of milli in doing so.

A special announcement for the prefix "kilo" points out that it means one thousand.

On the "Moment of Music" segment, we find a big singing group with a big band sound performing a metric prefix song.

Following the song, an ad emphasizes that all the commonly used metric measures--meter, liter and gram--have symbols. Meter is "m", liter is "l" and gram is "g". These are symbols, not abbreviations, and therefore never have a period following them.

"Meter Reader" emphasizes the fact that the prefix "deka" sometimes may be spelled "de a" and that you sometimes may see incorrect usage of the symbol for deca. The correct symbol is "da". But sometimes, and you may see this quite often, the symbol is written "dk".

In the "Metric Minit Movies," the monster is chasing a damsel who is in great distress. And through all this excitement, the monster and the damsel are able to illustrate some of the symbols used for metric measurement.

In the "Harvey and The Professor" segment, Harvey is building a star ship and he wants to send the words "meter," "liter" and "kilogram" to another galaxy, but finds the words are too long. He doesn't know what to do. The professor helps him solve his dilemma by telling him he can send the symbols instead.

On "You Are The Contestant," the topic for questions is prefixes. The prefix "milli," along with the prefixes "centi," "deci" and "kilo" are emphasized.

Have you ever wondered how wide the Mona Lisa's smile is? Well you will find out today on our "Grand Tour".

"Measure for Tomorrow," a soap opera, introduces the Crayola family. Today little Leon Crayola has to stay after school and write words on the chalkboard. Will he outwit his teacher? You will have to watch and see.

Today Metric Man pays a visit to his dear little mother. Mom tries to cheer him up because he is feeling very, very low and she offers him some of her delicious soup.

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Of course it's alphabet soup, and within the soup he finds the symbols used in the metric system.

Follow-up Activities:

1. Outline on the chalkboard, overhead projector or the classroom wall a chart that one would use in teaching place value. However, instead of powers of 10, use the names of the prefixes for each place. Begin with "milli," "centi," "deci"; then use "basic unit," "deca," "hecto" and "kilo," reading from right to left. With this set up ask children to make their own charts similar to the one that you have outlined. And using this chart, record different measurements. As further reinforcement of the activity, have each student record in his chart, as you record on yours, specific measurements. Then read these measurements in many different ways, changing the basic unit used from time to time.

2. Play a game with the students that would involve using the metric prefixes and their symbols. Ask, for instance, the meaning for "ml" or "cm" or "mm". The students actually should be able to express whatever you ask for in pictorial terms. This could be accomplished by having little cut-outs of containers that would represent liters, by using a meter stick and, if you have them by showing items that would have kilogram, gram and milligram weights.

3. Reinforce the fact that in most instances we only need to use the basic units and those prefixes which are expressed in thousandths or thousands times the basic unit. During this activity make reference to some common equivalents to some of the measurements that make use of thousandths and thousands times a unit. You might illustrate that a millimeter is about the thickness of a dime, that a meter would come approximately to the hip or waist of an adult person, that the kilometer would be a distance that one would run from goal line to goal line on the football field 11 times. (If you have time, have students actually walk or run a kilometer!)

4. Make up your own game board similar to the one in our "You Are The Contestant" sequence and use the different prefixes, their meanings and their symbols, along with the basic units meter, liter and gram, to get across some reinforcement ideas of these important facts. This should be used only after reinforcement of the units using concrete measurement activities.

Lesson 7--THE SYSTEM IS BASED ON 10

After a commercial for the metric system emphasizing the fact that it eliminates excess work and inconsistency, we move to the newsroom where Howard Newday helps us relate the decimal system, our money system and the metric system of measurement.

On "A Moment of Music" today we have a song which emphasizes the prefixes and the fact that decimal systems use 10 and multiples of 10 as their basis.

A take-off on "The Princess and The Pea" is presented on "Fairy Tale Time". In this version all the mattresses have numerals, and the pea is really a decimal point which is moved around to change the value of the numbers represented by the numerals.

After a brief announcement indicating that multiplying or dividing a number by 10 or multiples of 10 really just moves the decimal to the left or the right, we have a special report which illustrates this same concept.

A special announcement, "Multiplication With 10," reemphasizes the fact that when we multiply by 10 or multiples of 10 we have a definite pattern for the movement of the decimal point.

A special report concerning the Pearl River Flea Farm finds a shortage of flea food. This necessitates division of a measurement of flea food by 10, 100 and 1,000.

Mr. and Mrs. Crayola plan some inferior interior decoration on today's "Measure for Tomorrow". They can't seem to agree on the measurement of the living room couch. Is it 2 meters or 200 centimeters long?

"Harvey and The Professor" finds Harvey in a dilemma because each of his junior scientists has come up with a different measurement for the same thing. The professor points out that in the metric system there are many ways of expressing the same measurement, depending upon how precise you would like your measurement to be.

Metric Man and the Inchworm have a converting contest. Metric Man converts from one unit to another in the metric system while the Inchworm converts from one unit to another in the English system. The Inchworm tries to win by false pretenses, and thereby hangs a tale.

On the closing news brief, Howard Newday recaps the major ideas of today's program.

Follow-up Activities:

1. Discuss the fact that our base 10 system of numeration, which uses powers of 10 to determine the value of numerals in our numbers, is really the same type of notation used in our metric system measurements. That we can change the unit from meters to millimeters, but each unit is still related by 10 or 100 or 1,000 to the basic unit, should be pointed out. You can show this by developing an overhead transparency that would have the metric prefixes and the powers of 10 on two separate sliding panels. As you change your unit from meters to millimeters, you could slide down your powers of 10 to have 10 to the zero power meaning the number of millimeters, 10 to the first power meaning the number of centimeters and so on.

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2. Give the students several measurements and ask them if they can express these in more meaningful terms. In other words, if they have been given so many hectometers have them express this measurement in meters or kilometers. We must remember that, as a general rule, it is much more convenient and it will be less trouble to use only the basic units and the multiples that are a thousand times or a thousandth of the basic unit.

3. Reinforce the concept of multiplying by 10 or multiples of 10 by working several examples in the long form and then shorten this to the algorithm (rule) for moving the decimal when multiplying by 10 or multiples of 10. Repeat the same type of activity, but this time divide using 10 or multiples of 10.

4. Ask the students who are older and accustomed to using the English system to convert so many inches to yards; then ask them to convert so many centimeters to meters. Let them draw their own conclusions as to which system is easiest to use. In certain cases some students may say they prefer the English system, but they may do this simply because they are more familiar with it. It is believed, if you ask them, they would say they preferred not to do long divisions involving two-digit numbers like 36. Pick a convenient length that can be measured by every person in the classroom and ask them to record this length in any unit that they would like to use. See how many different units were used. Essentially one or two units probably will be most used, but point out that you can express that measurement, whatever it is, in many ways within the metric system using metric units. You also could express that measurement is used in several ways using the customary system. Which is easiest?

Lesson 8--IT'S ALL BASED ON THE METER

In his opening news segment, Howard Newday points out that the metric units we commonly use are interrelated.

On "A Moment of Music," we repeat the popular jazz song "It's All Based on The Meter."

Harvey needs help in deciding how much material he would need to cover a cubic decimeter. The professor helps Harvey by teaching him a lesson on area.

A new quiz program, "Beat The System," presents competition between two smart (?) contestants.

On today's "Grand Tour" we find the moon is only 380 thousand kilometers away from the earth.

Today's farm news helps us to understand what a hectare is. A hectare is a temporary unit in the metric system used for measuring land area and is equal to 10,000 square meters.

A follow-up comedy session finds the idea of ares and hectares reinforced.

The history of the metric system is presented on our movie. Briefly, the development of the metric system from the days of the French Revolution to the standardization provided by the SI (modern version of the metric system) is presented.

Mrs. Crayola ponders her weight problem on our "Measure for Tomorrow" segment.

On "Metric Man" today, a cubic decimeter container is shown to be a liter container, also.

Follow-up Activities:

1. Ask the students to think about the jazz song that was repeated on this program called "It's All Based on The Meter". Then ask them if they are now able to relate why this song was presented. The students should be able to relate that the liter is equivalent to one cubic decimeter and that one cubic decimeter of water is approximately one kilogram mass. Also develop the relationship, as expressed in the song, that 1ml of water is the same as 1 cm^3 of water and that both weigh 1 g. (It should be noted that the notation for square and cubic units in the metric system is diffent from that which the viewer might have been familiar with. Point out that rather than writing cubic meters as you might have done, the <u>new</u> way of distinguishing metric units as being cubic or square measure involves a superscript numeral which identifies square and cubic measures.)

2. Find some cartons or containers that will hold a liter of a liquid, preferably water, and have the students mark the volume of these containers at the liter level. In each case, the volume of each container should be found by measuring its three dimensions (to the liter mark). The volume should be about one cubic decimeter. Then have the students determine the weight of these different "liters." Considering that the weight of the container would be extra, these weights should be approximately 1 kilogram.

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3. Using paper marked in centimeter squares, develop the basic ideas of area and volume. Build up to a square decimeter and then cubic decimeter. Ask the students if they see the easy way of finding the area of any figure. They should develop the general formula of finding area this way. Then, try to help them determine how they might find volume, particularly the volume of a prism, in the same manner.

4. Have the students determine what a hectare is and have them relate the fact that it is a square that is 100 meters by 100 meters to a scale drawing of a hectare. In this case you may use one square centimeter to represent one square meter.

5. Review the System International symbol, SI, and reinforce the fact that this system of units is used throughout most of the world. You might want to make a special assignment to students to have certain ones determine what SI units are most widely used.

6. It should be obvious to the students by now that a measurement is composed of two parts--a number and a unit of measure. If it is not, please try to ingrain this fact by showing that expressing measurement of an area (or any measurement) in writing as simply "10" rather than "10 m^2" will be ambiguous.

Lesson 9--USING THE METRIC SYSTEM EVERY DAY

In the opening animation for this program, the units meter, millimeter and kilometer are emphasized.

The fact that most of the commonly used units of measure in the metric system were derived from the meter is reemphasized. The facts that the metric system is being used more and more in our daily life and that it will be more convenient to use these units in our daily life also are emphasized.

On our "Metric Arts and Crafts" segment, a special chart is designed to help persons find a quick and easy way to convert from one unit to another in the metric system.

On "A Moment of Music," we have the rousing number, "It Takes 10".

There is a dilemma in the Crayola household as Malcom searches for his lost whistle but instead finds several metric measuring instruments on "Measure for Tomorrow".

Today's "Meter Reader" emphasizes the fact that meter may be spelled meter or metre and liter may be spelled liter or litre but that their symbols--no matter how the words are spelled--are always "m" and "l".

On the "Metric Minit Movies," we find another damsel in distress. She is tied to the railroad track and a puppet character must perform several activities using metric measurements in order to save her.

In our special magic act ad, we find centimeter and decimeter related to the meter. Then the cubic centimeter is related to the cubic decimeter and these are related to the cubic meter.

Howard Newday graphically illustrates the heights of some of the world's landmarks. Then Southerly Trend presents the weather. Of course, the temperature is presented in degrees Celsius.

On today's "Harvey and The Professor," we find Harvey disappointed to find that not all metric units are based on 10--that the second is a metric unit, but that the hour is not. The minute, of course, is equal to 60 seconds. The professor reinforces, however, that the other units like meter, liter and gram and their related multiples are based on 10.

A special "Metric Survey" asks the viewers to try to relate traveling 50 miles an hour to traveling so many kilometers an hour.

Ralph tries to invent his own measuring system on today's "Metric Man" segment. But everybody comes to the conclusion that the metric system is already the best system of measurement to use.

On the final news segment, Howard Newday shows that an average person can use the metric system. He reemphasizes the mechanical method of converting from one metric unit to an equivalent metric unit.

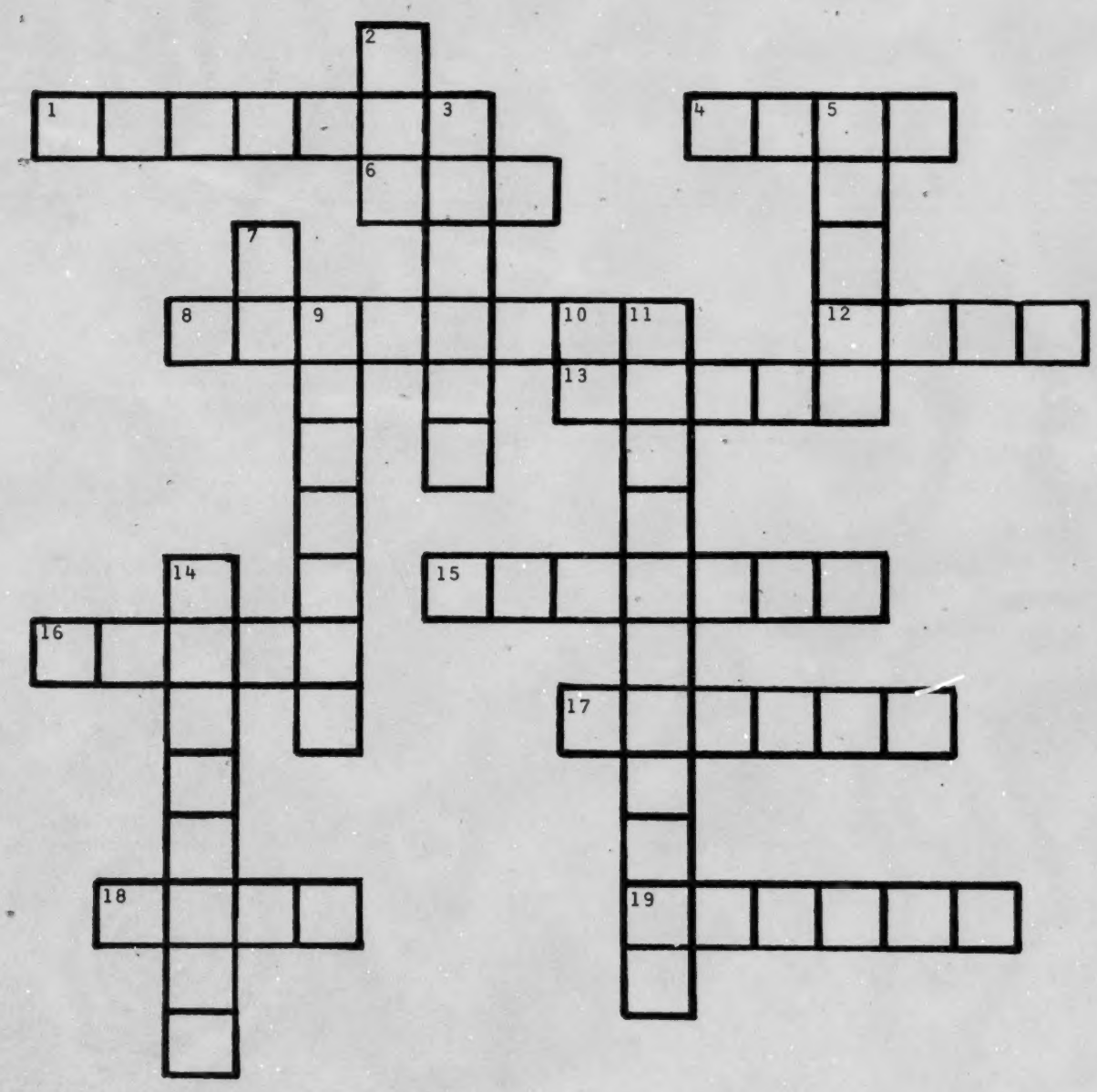
Follow-up Activities:

1. Point out the differences in spelling that one might encounter using the metric system in this country. Especially make note of the fact that "ER" and "RE" spelling for meter and liter are both correct and that at this point in time it has not been determined that one will be used more than the other in this country. (The Bureau of Standards in a statement issued in 1973 recommended that the "ER" spelling be used for students up through high school and that the "RE" spelling be used for students in technical work or in college.) However, reinforce the fact that the symbols for these units, no matter how the units are spelled, will always be the same--that they are standard.

2. Have the students perform their own version of some segment of the program, preferably the news and weather, and let them give the news of certain events around the school campus. Have them relay certain historical facts and facts of community interest that may be funny or serious but always given in metric terms. Also be sure the weather presentation is given in degrees Celsius. They might give the time in seconds, saying this is a metric term, but that since most of the world understands metric time already, we will use minutes and hours as we always have done.

3. Have the students make a collection of labels from containers, newspaper articles, metric charts, etc., to be displayed on a bulletin board.

4. Use the metric crossword puzzle in the guide as a follow-up reinforcement activity.



Note: See next page for clues.

ACROSS

1. The metric system is based on 10--it's a_____system.

4. If you are taking pictures, you might buy 8 mm, 16 mm or 35 mm_____.

6. Decimal means_____.

8. The_____is the most commonly used unit of weight.

12. The metric system has been adopted for use throughout the world--one of the reasons is probably because it's_____to use.

13. The standard and basic unit of length in the metric system is the_____.

15. Liters are used to measure the volume of_____.

16. One must be_____careful in using decimal notation, since a misplaced point changes the value of a number.

17. We often see the symbols kg, g and mg--we know that these are units of_____.

18. Although we commonly refer to the kg as a unit of weight, it is really the standard unit of_____.

19. A measurement consists of two parts; a_____ and a unit of measure.

DOWN

2. If you weigh 200 kg, you're probably too_____.

3. The centimeter is a metric unit of_____.

5. The_____is just a little larger than the quart.

7. _____is the symbol used to identify the International System of Units, the modern version of the metric system.

9. Since the metric units of length, weight and volume are interrelated, it is a much more_____system than the English system.

10. To learn the metric system, one should say to himself, "I_____going to have to use it, so I might as well learn it now."

11. 28 cm should be the_____length of this sheet of paper.

14. The fact that the metric system is a_____system of measurement means that it is based on unchanging, universally accepted, model units.

Lesson 10--WHAT DO WE KNOW ABOUT THE METRIC SYSTEM?

After the program opens with the meter, liter, kilogram animation, Howard Newday begins to recap ideas presented in the first nine programs of this series. It is emphasized in one news segment that the United States now stands alone using the old English system.

A 1950 style rock-and-roll song is featured on "A Moment of Music". Of course, it's a metric rock-n'-roll song.

A special advertisement for the decimal system again relates our system of money to the metric system of measurement.

On "You Are The Contestant," a review reinforces common relationships within the metric system.

The Celsius temperature scale advertisement is presented, explaining that 0 is the freezing point of water and that 100 is the boiling point on the Celsius scale.

"Harvey and The Professor" are sending a robot named Alexander on a special experimental flight into space. They have to make sure he is ready, so they have to measure him. He is measured in metric units.

"Beat The System" finds the same two contestants who competed in the previous program again trying to win fame and fortune as they answer questions concerning the metric system.

A special "Metric Survey" asks, If one had 10 liters of water, what would they weigh?

Miss Amanda is at home working a metric jigsaw puzzle when who should drop in but Metric Man. Metric Man helps her solve her puzzle--it's really a device for emphasizing the metric prefixes and their symbols--and once more gets himself involved in a little bit more than he can measure up to.

On today's final wrap-up of the news, Rhoda Reuter asks some of the same questions she asked on the first program of the series.

Follow-up Activities:

1. Review or let the students review all the concepts that they can remember that have been presented in Lessons 1 through 9. A way of doing this might be to have them recreate some everyday activities that they would encounter using measurements. Of course, they should use metric units of measure in recreating these activities.

2. If you have not used the relationship idea for temperature in the Celsius scale, then you might at this time have pictures of activities that students would be familiar with. Then let them guess the Celsius temperature that would correspond to each of these pictured things.

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3. Ask the students to make up their own metric survey and have them bring objects that can be measured in meters, centimeters, liters, grams, kilograms, etc., to include in this project. First, you should encourage them to pick a suitable unit of measure for measuring each object and they should estimate on paper the measurement of each. After the estimation has been made, they should measure the object if possible and determine a useful precise measurement. Then they should check their estimation against their actual measurement.

4. At this stage of viewing lessons, it would be appropriate for the teacher to ask the students to relate any attitudes they might have encountered concerning metric. If they have encountered negative attitudes, the teacher should help them understand the reason for such attitudes. In most cases, this reason is that the person does not understand metric at all and therefore thinks that it will be a difficult thing to learn.

5. It would be appropriate at this time to play a metric game that involves two sides or two contestants. It could be a question-and-answer type game or it could be an activity-oriented game, but it should be something that would let the students see that there is great ease in using the metric system for quick thinking and quick figuring. It could be just a conversion in the mind from one metric unit to another, but could include a "guess the length of this to the nearest centimeter" type of activity, also.

Lesson 11--COMPARING LENGTHS

In today's program, common English units of length and the metric units of length that would replace them are compared. Also, most of the basic information concerning length which was presented in Lessons 1 through 10 is reinforced.

Particularly relevant are the comparisons presented by establishing easy-to-remember ratios for the sake of conversion. We do not want people to convert from one system to the other but we realize that some folks who have knowledge of the customary system will need to use some basic conversion factors for awhile.

Therefore, within this program we present these relationships: 2 inches is approximately 5 centimeters, 10 yards is approximately 9 meters, and 5 miles is approximately 8 kilometers.

We also illustrate that by using metric units of measurement for length, we are able to arrive at easier-to-work-with units than had we used the customary measurements, which would involve using common fractions.

Follow-up Activities:

1. The metric units that commonly are used should be compared to the old English or the customary units of length. It should be pointed out, as it was pointed out in the program, that it takes about 5 centimeters to equal the length that is 2 inches. Therefore, we can establish the simple ratio 2 to 5 in our minds to convert easily when conversion from one system to another is necessary. Several problems converting commonly used inch measurements like waist measurements and chest measurements to centimeters should be assigned just for the activity. Emphasize, however, during this activity that for the most part, one will not need to do much conversion between the two systems.

2. Try to relate the fact that 10 yards is approximately 9 meters and that 5 miles is approximately 8 kilometers. Use these ratios in working some problems that can be figured easily in one's head. Point out at this time that the length of a football field probably always will be given in yards, and it will not be necessary to convert from yards to meters or from "inches to go" to "centimeters to go" in football games.

3. Give some problems using actual measurement activity that would show that it is much easier to measure small items more precisely in the metric system than in the English or customary system. This type of problem might involve having the student make measurements precise to 16ths of an inch in the English system and precise to millimeters in the metric system.

Lesson 12--COMPARING UNITS OF WEIGHT

The opening animation of this program helps get across the point that the GRAM is a very small unit of weight or mass--much smaller than an ounce--but is the basic (naming) unit of weight in the metric system. Then, it emphasizes the prefixes that commonly are used and the fact that they can be used with gram to form different units of weight.

In this program, in many cases we attempt to relate the fact that one kilogram mass weighs about 2.2 pounds. This is emphasized in several segments. We hope, however, that most folks will just rely on the fact that anything weighed in kilograms will weigh approximately half as much as it weighed in pounds.

Again, in this program we emphasize the commonly used metric units--the gram, the milligram and the kilogram--for weight rather than emphasizing all the units that can be formed with the common prefixes.

It's pointed out that a nickel weighs about 5 grams.

We relate the Celsius and the Fahrenheit temperature scales by pointing out the freezing point and the boiling point of water on each.

Visual representations to illustrate the relationship of one pound to one kilogram appear in the program, also.

It also is pointed out that usually when we discuss weight we are concerned with things right here on the earth where the pull of gravity is always the same. So we express weight in terms of the kilogram. But the unit "kilogram" really refers to the mass of an object--how much is contained in a certain volume.

Follow-up Activities:

1. Again, reemphasize the fact that the gram is a very small unit of weight or mass. It would be approximately the weight of one standard size paper clip or the weight of one M & M candy. Point out that this metric unit, gram, is much smaller than an ounce, but show that it is much easier to use grams to get kilograms than it is to use ounces to get pounds.

Express the weights contained in certain books or displayed in certain locations in metric units by using the fact that one kilogram is equal to approximately 2.2 pounds.

2. Bring several items that are marked in pounds and group them together in kilogram units. An example of this might be two, 1-pound coffee cans that you could rename as approximately 1 kilogram or the illustration that is commonly used by the Bureau of Standards which is 2 lbs. of butter in stick form plus an extra stick.

3. Explain that there is a difference in weight and mass by reemphasizing what happens when an astronaut travels in space. He becomes weightless but his mass has not changed. Weight, therefore, is related to the pull of gravity whereas mass has only to do with the substance contained in a certain volume. But point out that, for practical purposes, equivalent masses will have equivalent weights here on earth.

Lesson 13--COMPARING UNITS OF VOLUME

In this program, we relate the liter to the quart. We do this visually and verbally, and we build several segments around the concept that a liter is just a bit more than a quart.

We try to point out the fact that the liter commonly will be used as a measure for volume of liquids. However, it is not restricted to use with liquids since the liter is defined as being a volume of one cubic decimeter.

We also use the notation cm^3 to show that this symbol is used in place of the common "cc" in medicine that one is familiar with.

In this program, we only emphasize the units of the metric system that are related to the basic unit, liter, by steps of a thousand. We emphasize milliliters, liters and, to a lesser extent, kiloliter.

Follow-up Activities:

1. Bring several different containers that are marked in quarts and experiment to see if you can make a liter of liquid fit into these containers.

2. Emphasize the fact that the notation for square and cubic units in the metric system is different from that which the viewer might have been familiar with. Point out that rather than writing cubic meters as you might have done, the new way of distinguishing metric units as being cubic or square measure involves a superscript numeral.

3. Have the students participate in an estimation activity that would include estimating the number of liters that a gas tank in certain cars would hold if it held 20 gallons, or in estimating the number of liters that a 20-gallon trash can might hold. (Answer: about 75 liters.) Next you might ask the students to determine by experimenting the number of liters a gallon container would hold.

Lesson 14--SCIENCE AND THE METRIC SYSTEM

In the opening of this lesson, we attempt to present the seven base units of the SI system in use today--not for real explanation but for familiarization. Then, throughout the program we attempt to show how some units which are used for scientific and technological purposes are familiar to us and that these are really SI units.

Also built into this program is a special teaching segment on scientific notation.

In scientific notation numbers are expressed in two parts, the first part being a factor that is at least one but less than 10, and the second part a power of 10. Since this form is used in science with the metric system, we feel it is important to emphasize it in this lesson with students at the junior high level or above.

One other important thing that we attempt to do in this lesson is extend the concept of metric prefixes to those greater than kilo and less than milli. We do this by simply presenting the fact that these other prefixes exist and can be used with SI metric terms.

In his final news segment, Howard Newday moves rapidly from pointing out that the metric system is the language used right here on earth to illustrating that the metric system is also the language used in space.

Follow-up Activities:

1. Review the meaning of the SI system of units and perhaps display a poster of these units which is obtainable from the U.S. Government Printing Office. It should be pointed out that our purpose in the television lesson was only to familiarize the student with these units and not to force any extensive learning of the scientific principals involved in their use.

2. Since scientific notation was presented in this program, it is a good idea to reinforce this concept by providing several large measurements expressed in scientific notation to be interpreted by the students. Then perhaps you could ask them to record in scientific notation several real measurements that would best be written in the scientific notation form.

3. Point out that although we have emphasized only certain common prefixes of the metric system, other prefixes do exist and these extend in value above the kilo prefix and below the milli prefix. It also should be pointed out that these other prefixes ascend and descend in steps of a thousand rather than in steps of 10.

4. Have the students make a survey of units that are used by the National Aeronautics and Space Administration (NASA) in its space experiments.

Lesson 15--YOU CAN USE IT NOW

The object of this program is simply to reinforce (point out) the fact that the metric system can be used right now in everybody's life as they carry on their daily business in the United States.

Many of the segments in this program are repeats from the previous 14 programs and serve as a review of the content of the past programs, as well as pointing out the importance of using the metric system every day.

Although the customary system of measurement is a system that many will insist on using even after the country is forced to go metric, we feel that some of the arguments presented in this program for using the metric system will tend to influence even those die-hard customary measurement system users.

In the final segment, the viewer is told that if he desires further information about metric he can write to the Bureau of Standards, Office of Metric Information, Washington, D.C. 20234. If you would like more information about the metric system, or if you would like to keep informed, we suggest that you write to this office now and ask to be placed on its mailing list.

Hopefully, after viewing this series a person will be able to use the metric system and will like using it. However, even if a person doesn't like using the metric system we hope he will be familiar enough with it and its terms to be able to use it in his daily life.

Follow-up Activities:

1. Have the students make a survey of units that are used on electrical equipment, or any sort of technologically designed equipment, and see if they can find units which they believe to be metric units.

2. Discuss why you think certain segments were included in this series and have the students particularly express why they think we use metric songs and commercials in our lessons. (The purpose is to inculcate the idea that the metric system is more than just mathematics or science--it's a part [or will be] of our daily life skills.)

3. If you are a courageous soul, have the students make up their own dance to illustrate the words of the song, "It Takes 10".

4. Do measuring activities using metric measures! Do others; then do even more!